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SURVEY OF CONGENITAL RUBELLA SYNDROME, MONTREAL, LAVAL, AND MONTÉRÉGIE, QUEBEC, 1985–1991

Introduction

Four cases of congenital rubella syndrome (CRS) were reported to public health authorities in Quebec in 1991, which is as many as were reported for the entire period of 1985 to 1990[1] (unpublished data). According to Cochi et al[2], passive surveillance systems find only 22% of confirmed or compatible cases of neonatal CRS. Aware of these facts, public health authorities in Montréal, Laval, and Montérégie searched for cases of CRS between 1985 and 1991. These three regions in southern Quebec have 3.2 million inhabitants, accounting for almost half the population of the province.

Method

Cases of CRS were identified through (1) records of positive cultures for the rubella virus and positive serology results for immunoglobulin M (rubella-specific IgM)* from the virology laboratories of the two tertiary care pediatric hospitals in the three regions; and (2) the CRS and rubella-maternal care diagnostic codes in the MED-ECHO database (a centralized provincial registry of diagnoses upon hospital discharge). The case definitions used to identify clinical and confirmed cases of CRS are those used in Quebec for surveillance purposes[4].

The medical and hospital records of the children and mothers identified were reviewed by questionnaire when the records were in a hospital in one of the regions in the study, the mother lived in one of the regions when the child was born, and the child was born between 1 January, 1985, and 31 December, 1991.

* Serology results were examined for children < 1 year. Children are usually vaccinated for rubella at 1 yr, so that the presence of IgM in a vaccinated child does not necessarily indicate a natural infection because IgM can be detectable up to 4 yrs following immunization[3].

Results

Children

Through the virology laboratories, nine cases were found to meet the criteria. Only five of these cases were traced through the MED- ECHO database. Table 1 summarizes the information on these nine cases.

Mothers

Information was available on seven of the nine mothers. Three of the seven had given birth at least once before; files on each of these three women contained a negative serologic result. In seven cases, the immunization status was unknown; the other two women knew that they had not been vaccinated (one had refused vaccination).

Five women had a history of rash illness in the first trimester. This information was often collected after the birth of the abnormal child. The rubella diagnosis was confirmed in one mother during pregnancy. Two others reported, retrospectively, that they had been exposed to a person with a rash illness during their first trimester.

Discussion

The case-finding, though active, was not meant to be exhaustive. Nonetheless, it confirmed the underreporting of CRS in Quebec: only five of the nine cases identified in the study had been reported. Because most of the cases that were detected presented with multiple abnormalities, it might be concluded that the less severe cases of CRS are not being diagnosed, much less reported[2].

All cases reported here were found through the laboratory records of the pediatric hospitals that performed the serology and did the culturing for *Rubivirus*. In Quebec, reporting a case of

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rubella or CRS is the responsibility of the attending physician and not the laboratory director.

The review of the mothers' and children's files revealed failings in the application of preventive measures and in the diagnosis of rubella during pregnancy. Women susceptible to rubella can start a new pregnancy without having been immunized against the disease.

A history of rash illness in the first trimester or contact with a person with such an illness was found, retrospectively, in most of the mothers. Without directly contacting these women, it is impossible to verify whether they had brought the disease, or their exposure to it, to the attention of their physicians.

Table 1
Description of nine cases of CRS identified from the laboratory records of the pediatric hospitals in three regions of Quebec

Case	Month-year of birth	Laboratory diagnosis	Congenital cataracts	Hearing loss	Congenital cardiac abnormalities	Neurologic damage	Other abnormalities
A	01-85	IgM +, Cult +	—	+	—	—	—
B	02-85	IgM +, Cult +	+	+	+	A	F, G, J, K
C	11-85	IgM +, Cult +	Glaucoma retinopathy	+	+	A, B, C	G, L, I
D	11-85	IgM +, Cult –[1]	—	+	—	—	I
E[2]	12-85	IgM +, Cult –[3]	+	—	+	A, E	F, G, I, H
F	05-88	IgM –[4], Cult +	+	—	—	—	—
G	11-89	IgM +, Cult +	—	+	+	C, D	G, H, I
H	01-91	IgM +, Cult +	+	—	+	—	F, G
I	03-91	IgM +, Cult +	+	+	+	E	F, G, J

[1] Samples (throat, stools, urine) taken at 1 year.
[2] Died 2 days after birth
[3] Autopsy samples (heart, cerebrospinal fluid)
[4] Serology at 18 months.

A = meningoencephalitis
B = microcephaly
C = mental retardation
D = cerebral palsy
E = arachnoid cysts
F = purpura
G = thrombocytopenia
H = splenomegaly
I = hepatogemaly
J = jaundice
K = osteal lesions
L = hypotonia

Recommendations

A. *Surveillance*

- To improve the rubella and CRS surveillance system, steps must be taken to have laboratory directors report positive results from rubella-specific IgM serology and positive *Rubivirus* cultures. The *Regulation Respecting the Application of the Public Health Protection Act* should be amended for that purpose.
- An epidemiologic investigation should be conducted for each case.

B. *Preventive Measures*

As recommended by American and Canadian public health authorities[5,6], it is important to promote the following preventive measures:

- *Pre-pregnancy immunization*: Physicians should take advantage of every clinical contact with women of childbearing age to check their immunity to rubella (proof of vaccination or positive result from a previous serology test). In the absence of such proof, these women should be vaccinated.
- *Postpartum immunization*: Women identified as seronegative at the start of a pregnancy should be immunized after giving birth and before being discharged from hospital.
- *Prenatal history*: Physicians should look for *any* history in pregnant women of rash illness or exposure to a person with an illness suggestive of rubella. Pregnant women should be alerted to the importance of informing their physicians of such a history during the first half of pregnancy.

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SURVEILLANCE OF CONGENITAL RUBELLA SYNDROME AND OTHER RUBELLA- ASSOCIATED ADVERSE PREGNANCY OUTCOMES

Eliminating indigenous rubella infection during pregnancy by the year 2000 and thus preventing fetal damage, congenital rubella syndrome (CRS), and other negative outcomes of infection was the goal set during the Consensus Conference on Rubella held in early 1994[1]. Among the recommendations were the following:

1) *revise the definition of CRS to include categories of compatible and possible cases and develop additional definitions to monitor other negative impacts of rubella infection during pregnancy, including fetal deaths, induced abortions, and asymptomatic congenital infections*
2) *implement an aggressive surveillance for CRS, investigate each reported case, and maintain and enhance active surveillance through IMPACT (Immunization Monitoring Program, Active).*
3) *develop methods to identify induced abortions following maternal infection.*

In December 1995, 10 provincial and territorial epidemiologists reached consensus on a modified case definition for congenital rubella. This definition is currently being used in a national pilot surveillance system of rare pediatric conditions.

To reach the goal, the remaining recommendations will have to be implemented soon. During the period 1989–1993, a mean of 1,150 cases of rubella were reported each year; 15% were in females of childbearing age (unpublished data). As demonstrated by surveys in Manitoba, Ontario, British Columbia, and Quebec, the proportion of pregnant women susceptible to rubella varies significantly from province to province, ranging from 2.3% to 13.3% (unpublished data). This difference is probably due to the different immunization practices before 1983, when MMR (measles, mumps, rubella) immunization of infants 12 to 15 months became routine in all provinces[2]. Also, in Manitoba for example, prepubertal females aged 11 to 12 years are vaccinated unless they have documented evidence of immunization or laboratory evidence of detectable antibody.

Current CRS Surveillance Systems

Only CRS is currently reportable in Canada; there is no surveillance program for other rubella-associated adverse pregnancy outcomes. Two CRS surveillance systems are now in place: a passive one, the national notification system implemented in 1979; and an active one, IMPACT, which started in 1992.

The passive surveillance system involves the aggregated data system and the case-by-case program. The aggregated data system consists of monthly reports of CRS by age and sex from the provinces and territories. While a mean of three cases per year has been reported in the last 10 years[3,4], a study in Quebec confirmed that there is significant underreporting of CRS[5]. In addition, mild cases, which probably represent at least 50% of all cases, are often undiagnosed[6]. The case-by-case system could provide more detailed information, but this database is incomplete because some provinces are still not reporting, some report sporadically, and the information provided is not uniform and often not pertinent (unpublished data).

The active surveillance system, IMPACT, includes CRS in the list of surveyed diseases. Eleven pediatric centres throughout Canada, accounting for approximately 85% of tertiary care pediatric beds, produce monthly reports with complete information including date of birth, date of diagnosis, clinical description, maternal history including rubella-like illness during pregnancy, and immunization status. Each reported case is reviewed by an investigator. This system provides valuable information on the CRS cases diagnosed in pediatric centres, but these cases may not necessarily represent the full spectrum of clinical presentations of CRS.

Cases of CRS plotted by year of birth (as obtained by the case-by-case database and through IMPACT for the period 1989 to 1994) show a similar trend to that of rubella cases. The peaks for CRS occur one year after those for rubella, which is consistent with the expected outcome given the normal duration of pregnancy. However, there is less similarity between the patterns of reported frequency of CRS by year of reporting and rubella during the same period.

Canada currently has no system for reporting abortions due to rubella infection or contact. In the United Kingdom, where such a system does exist, there were more than 3.5 abortions due to rubella infection or contact for each reported child with confirmed or suspected CRS for the period from 1980 to 1989[7].

Possible Surveillance Systems

The Canadian Paediatric Surveillance Program should overcome the limitations of the current CRS surveillance systems. This new program, started in January 1996, consists of an active mailing surveillance system, under the aegis of the Canadian Paediatric Society (CPS), modelled after a similar, effective program in the United Kingdom[8]. The CPS seeks the participation of all pediatricians. When a case is reported, the physician is contacted to provide more information, to confirm the case, and to identify duplicates and reporting errors. This community-based surveillance system will increase the chance of detecting the mild or single-defect cases of CRS reported.

For surveillance of rubella-associated adverse pregnancy outcomes other than CRS, three potential sources of information are hospitals, abortion clinics, and laboratories.

Implementing a surveillance system through hospitals or abortion clinics would be difficult. First, a national survey to compare the proportion of abortions being performed in hospitals to those in abortion clinics would be needed. Second, trying to contact all physicians who perform abortions, to educate them about this new reporting system, and to maintain their motivation to report when the events are rare would be a daunting task. Third, this system would depend heavily on the good will of physicians to report and, consequently, is unlikely to provide reliable information.

Therefore, the Laboratory Centre for Disease Control (LCDC) is considering implementing a reporting system through laboratories. The proposed system would be based on laboratory-confirmed rubella cases in females of childbearing age (15–45

years) by provincial public health laboratories and university hospital laboratories. These two groups perform most of the rubella-specific IgM testings in Canada. In each laboratory, a designated staff member would attach a case-investigation form to each positive result forwarded to the local medical officer of health, who would inquire about the pregnancy status of the laboratory- confirmed case. If the case is pregnant, an investigation would be initiated to assess the outcome. LCDC would (1) develop a protocol for data collection, investigation, and follow-up; (2) collect and analyse epidemiologic data; and (3) disseminate the information. There are three main advantages of this system: it would implicate a limited number of laboratory personnel; the public health sector is more reliable than physicians in reporting diseases; and the system would allow surveillance of other pregnancy outcomes besides induced abortions, such as spontaneous abortions and in utero deaths. The main disadvantage would be the lack of capture of the voluntary termination of pregnancy where there has been contact with a rubella case without demonstration of infection in the pregnant woman, which may be a significant proportion of abortions related to rubella[8].

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SURVEY OF POSTPARTUM RUBELLA VACCINATION, MONTREAL, LAVAL, AND MONTÉRÉGIE, QUEBEC, 1992

Introduction

Between July and October, 1992, hospitals in the regions of Montreal, Laval, and Montérégie were surveyed by questionnaire about their practices with respect to antepartum rubella serologic screening and postpartum vaccination of seronegative women. Twenty-two hospitals in the regions had an obstetrics department. The total number of deliveries in 1992 was 51,040: 32,864 in Montreal, 13,670 in Montérégie, and 4,506 in Laval.

Results

Nineteen of the 22 hospitals participated: all 12 hospitals in the Montreal and Laval regions, and seven of the 10 hospitals in Montérégie.

Screening Tests

All the hospitals performed their own qualitative rubella screening tests, either by ELISA or the LA (latex agglutination) test. The positivity threshold values varied between 10 and 20 IU/mL depending on the technique or the commercial kit. Three of the laboratories reported that 6% to 11% of rubella screening tests were negative.

Postpartum Vaccination

The percentage of women vaccinated during the postpartum period in each hospital was estimated by dividing the number of vaccines with the rubella component requisitioned by the number of deliveries reported during the same year (Table 1). In 11 hospitals, the percentage of parturients vaccinated ranged from 0.5% to 8.6%. In seven hospitals, no vaccines were sent to the postpartum department during the period under study. For the last hospital, the patients of some physicians were vaccinated before their discharge, but the pharmacy department was unable to specify the number of vaccines prescribed.

In the hospitals where vaccinations were administered, the reasons stated for not vaccinating certain patients were as follows: nursing mother (n = 3), discharged too quickly from the hospital (n = 2), administration of Rh_0 immunoglobulin (n = 2), oversight (n = 2), patients referred to the local community health centre (n = 1), and blood transfusion (n = 1).

Discussion

At the outset, the survey was exploratory. Not all respondents were department heads, and the information provided was not validated against other information sources.

Laboratories

The survey did not make it possible to determine whether the laboratories performed the screening test systematically during routine pregnancy testing. Monitoring rubella seropositivity of parturients (primiparous and multiparous) is an excellent indicator for the ongoing evaluation of programs of vaccination against this infection. To this end, the results should be clearly identified as coming from pregnant women. Furthermore, the results should be kept in the computer system for a sufficient time to permit analysis at a later date.

Postpartum Vaccination

The practice of vaccination during the immediate postpartum period was not widespread. In 1992, more than 11,000 women gave birth in one of the seven hospitals that did not administer post- partum vaccinations. More than 6,000 women delivered in the other two hospitals where postpartum vaccination seemed to be a marginal activity. On the basis of these figures and assuming a

Table 1
Proportion of vaccines administered compared to the number of deliveries in hospitals in the Regions of Montreal, Laval, and Montérégie, 1991–1992

A — Approximate number of deliveries
B — Number of vaccines sent to the postpartum department
B/A — Estimate of the number of women vaccinated

Hospital number	(A)	(B)	(B/A) %
1	4,667	400	8.6
2	1,000	70	7.0
3	4,500	290	6.4
4	4,506	285	6.3
5	4,000	250	6.2
6	2,643	120	4.5
7	2,500	100	4.0
8	1,741	70	4.0
9	2,248	50	2.2
10	4,090	30	0.7
11	2,000	10	0.5
12	2,900	0	0.0
13	2,757	0	0.0
14	2,200	0	0.0
15	1,400	0	0.0
16	1,374	0	0.0
17	591	0	0.0
18	186	0	0.0
19	2,600	na	na

seropositivity rate of between 6% and 11%, it can be estimated that, in 1992, 1,020 to 1,870 seronegative mothers in the Montreal and Montérégie regions were discharged from hospital without being vaccinated for rubella.

Case studies of congenital rubella syndrome indicate fairly consistently that one-third of cases occur in babies of multiparous mothers[1]. Considering the seriousness of this syndrome and the costs it entails, the necessary preventive measures must be rigorously applied. In this survey, a number of hospitals cited reasons for not systematically following these preventive measures. These reasons can be subdivided into two categories: reasons of an organizational nature (oversight, short stay, referral to centres outside the hospital), and erroneous contraindications (nursing mother, Rh_0 vaccination, blood transfusion).

The immediate postpartum period is the most opportune time for vaccination: The patient does not have to make a special trip and it is highly unlikely that she will become pregnant again within the month following her delivery. Once she has returned home, both she and her physician may forget. Ever-shorter hospital stays following delivery create additional difficulties for organizing vaccinations. As for the other reasons cited, some physicians must still be convinced that nursing, Rh_0 vaccination, and blood transfusion are not contraindications to rubella vaccination[2].

Recommendations

A. Screening

- The proportion of negative screening tests in parturients should be verified regularly in the laboratories.

B. Vaccination

- Efforts to promote vaccination in the immediate postpartum period should be aimed at physicians, nurses, and the general public.
- Immediate postpartum vaccination of patients susceptible to rubella should be required by a hospital regulation.
- The trivalent measles, mumps, and rubella (MMR) vaccine should be used.

The following measures would facilitate implementation of the postpartum vaccination program:

- All pregnant women should have the result of a screening test for rubella antibodies on their chart at the time of delivery. The woman's rubella vaccination history should systematically be taken and entered in the chart with the date of vaccination.
- Nurses could be given a permanent medical prescription authorizing them to vaccinate susceptible patients without waiting for the prescription from the attending physician.
- In the postpartum period, the nurse should verify the rubella (and hepatitis B) test results. A note on the hospital chart would ensure that the physician does not forget to prescribe the MMR if there is no standing medical prescription.

Survey Follow-up

At least four hospitals that were not providing rubella vaccination at the time of the survey are now implementing such a program.

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